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Supplementary Report on the Status of the  
Coeur d'Alene Salamander  
(Plethodon vandykei idahoensis) in Montana

David L. Genter  
Montana Natural Heritage Program  
Helena, Montana

and

Albert G. Wilson, Jr.  
and  
Evelyn M. Simon  
Washington State University  
Pullman, Washington

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by

The Montana Natural Heritage Program  
1515 East Sixth Avenue  
Helena, Montana 59620

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## Summary of Findings

The present study is a continuation of efforts, begun last year, to assess the distribution and microhabitat of the Coeur d'Alene salamander in Montana. Methods are the same as those in the original report except that substrate data were taken for individual salamanders during day-counts only. During night-counts we recorded substrate, water, and air temperatures once, prior to counting. This minimized our disturbance of salamanders and probably resulted in more accurate tallies.

Eight new localities are reported, with one a northern range extension on Lake Koochanusa. During visits to historic sites, night-counts revealed larger populations than were previously suspected in the Thompson River populations, and significant populations at the Surprise Gulch and Koochanusa sites. Salamanders were found well away from the original capture site at Troy 3, indicating a more extensive population there than reported previously. We found new signs of human disturbance at North Troy 1 and Big Hoodoo Mountain sites. No salamanders were found at the Keeler Creek, North Troy 1, Big Hoodoo Mountain, Troy 4, Woodman Creek, or Sweathouse sites.

Except for one individual found in a mine shaft, salamanders in new localities were associated with the same microhabitat types found in the 1987 study. The distribution of the Coeur d'Alene Salamander was not found to differ from what was reported previously.

## INTRODUCTION

The Coeur d'Alene salamander (Plethodon vandykei idahoensis) is a regional endemic restricted to very moist microhabitat in northern Idaho and western Montana. This is a Species of Special Concern in both Montana and Idaho, as listed by the respective state Natural Heritage Programs, and is a regional Sensitive Species, as listed by the US Forest Service, Region 1. The US Fish and Wildlife Service lists it as a 3C candidate species under the Endangered Species Act. The only formal protection given to the Coeur d'Alene salamander in Montana is the Forest Service status as sensitive -- and only then on USFS lands.

Concern over the viability of this species has resulted in range-wide surveys of known and potential habitat in Montana and Idaho over the past three years. Twenty-three new populations have been found in Montana and range extensions have been recorded to the north and southeast (MTNHP 1987, Genter 1988). However, the species remains of "concern" due to its limited and irregularly distributed habitat. Other factors include the poorly documented subterranean and hydric habitat requirements. Issues of genetic divergence and uniqueness between isolated populations are more than academic and may be central to the strategy for conservation of the Coeur d'Alene salamander.

This report summarizes the survey and monitoring activities during 1988 for the Coeur d'Alene salamander in northwest Montana. This document should accompany the "Status Report on the Coeur d'Alene Salamander (Plethodon vandykei idahoensis) in Montana" (MTNHP 1987). Those wishing a comprehensive overview of the life history, systematics, or ecology of the Coeur d'Alene salamander should refer to the earlier report or the cited literature within.

## Results of Study, Section 1. New site descriptions.

Except for being grouped according to their associated river drainages, these sites are described in no particular order. Data characterizing day-collected salamanders and associated substrates are given in Results Section 3. Specimens were collected from each site.

### Koocanusa 4a.

Kootenai National Forest in Lincoln Co. Kootenai River drainage. Salamanders found in a close series of rocky seepages on an east facing roadcut ~24 miles due NNE of Libby. Elevation is 2640 ft. Site is on the W side of Forest Route 228, 34.1 miles from its southern junction with State Highway 37. U.S.G.S. Quad; Inch Mountain 7.5 min. In Sect. 11; T34N, R29W. 48° 43' 52" lat., 115° 19' 15" long. See Map 1.

**Site description:** There are three lightly flowing seepages here, separated by (from south to north) ~38 m and ~15 m. All are similar, each comprising ~60 m<sup>2</sup> of damp area on stepped, fractured Belt rock, with 25°-30° slopes above. The southernmost site involves a bare cliff ~2.5 m high topped with bryophyte mat. The middle one is similar but with a very dense bryophyte mat covering ~80% of rock surface (Photo 1). The northernmost is similar but with less bryophyte. The upper extent of the seepages is below soil level atop the slopes above. Water is not culverted but percolates through riprap below the road.

The slopes immediately above the road are sparsely forested in immature conifers. The surrounding habitat type is probably PSME/PHMA with Pseudotsuga menziesii, Pinus ponderosa, and Larix occidentalis the prominent trees. There is no overstorey at the seepages but Amelanchier sp. and Salix sp. grow close by.

**Observations:** We performed a night count here at ~10:00 p.m., 9 May. Air temperature was 14°C and the temperature of emergent water in the seepages was 6°C. In the southernmost seepage we observed one salamander climbing a vertical rockface. We observed none in the boggy area atop the cliff. In a small, seemingly temporary seepage of ~1 m<sup>2</sup> midway between the southernmost and middle seepages, we counted two salamanders on vertical surfaces. We also counted two in the middle seepage, both on vertical rock. On vertical surfaces within the northernmost seepage we counted four salamanders, and in the damp area atop the rockface another seven.

**Population:** This may be a fairly large population. We feel our count may be lower than what we would find if we visited the site



later at night. The extent to which this site dries needs to be investigated. The slopes above the seepages, and areas surrounding seem too dry to support plethodontids.

#### Koocanusa 4b.

Kootenai National Forest in Lincoln Co. Kootenai River drainage. Salamander found in a rocky seepage on an eastfacing roadcut ~24 miles NNE of Libby. Elevation is 2640 ft. Site is on the W side of Forest Route 228, 34.4 miles from its southern junction with State Highway 37. U.S.G.S. Quad: Inch Mountain 7.5 min. In Sect. 11; T34N, R29W. 48° 44' 23" lat., 115° 19' 15" long. See Map 1.

**Site description:** This is a heavily flowing seepage involving an ~3.5 m high cliff of fractured Belt rock. The slope above is ~20°. There are ~30 m<sup>2</sup> of damp rock. Water flows over the rock but much runs out a horizontal pipe (Photo 2). There is a pooled area at the base of the cliff where water percolates below the roadway. Bryophyte mat covers ~30% of rock surface.

The slopes above the seepage are likely forested in PSME/PHMA with Pseudotsuga menziesii, Pinus ponderosa, and Larix occidentalis the prominent trees. There is little overstory at the seepage, ground cover is mostly grasses.

**Observations:** We performed a night count here at 9:48 p.m., 9 May. The sky was clear with the last rain on 7 May. Air temperature was 13.5°C and emergent water 6.5°C. We found one salamander on a vertical rockface.

**Population:** A night search here later at night would probably yield a higher count of salamanders. It is possible that a fairly large population exists here. Except in rainy periods, salamanders are likely restricted to the seepage area as the surroundings appear too dry for plethodontids.

#### Pipe Creek.

Champion International land in Lincoln Co. Kootenai River drainage. Salamanders found in an eastfacing, rocky seepage on a roadcut ~18 miles NNW of Libby. Elevation is 4120 ft. Site is on the W side of Forest Route 68, 22.9 miles from its southern junction with Highway 37, and 1.4 miles S (by road) of Flatiron Pass. U.S.G.S. Quad: Flatiron Mountain 7.5 min. In Sect. 31; T34N, R31W. 48° 39' 36" lat., 115° 39' long. See Map 2.

**Site description:** This is a lightly flowing seepage comprising a near vertical, ~4 m high fractured Belt rock cliff, and large scree pile at the cliff's base. The scree pile is sloped at ~45°

and separates the cliff from the roadbed by ~4 m. There is ~400 m<sup>2</sup> of damp area with ~80% covered in bryophyte mat. Above the seep are slopes of 30°- 35°. An old logging easement is 40 m above the base of a large scree slope. There is some water pooled in this easement. This and the damp area of the cliff appear to be the only free water in the immediate area. Water from the seepage percolates below the roadbed. Pipe Creek is ponded ~50 m below the roadbed.

The habitat type is difficult to determine owing to the immature state of the surrounding forest (old burn?). Picea sp. and Thuja plicata are prominent trees. Local undergrowth is mostly Pachistima myrsinites. Around the seepage grows Cornus sp. and Betula sp. There is a grassy ground cover and very little overstorey (Photo 3).

**Observations:** We found four salamanders here in an ~20 minute search at 1:45 p.m., 11 May. The sky was clear and no rain had fallen since 7 May. Air temperature was 23°C and emergent water in the seepage 11°C. All the salamanders were found in the scree below the rockface. This scree was very unstable so it seems likely that we disturbed and scared away salamanders as we searched.

**Population:** There may be a medium-large population here. There is not a great deal of damp surface area above ground, but we were able to find a fair number of salamanders in a short time. Locally, salamanders are likely restricted to the seepage area, except during rainy periods. The Pipe Creek area is very moist and should be surveyed further (See Results Sect. 4; 19,20,21).

### Koot Creek.

Kootenai National Forest in Lincoln Co. Kootenai River drainage. Salamanders found along a S flowing creek ~8 miles due E of Troy. Elevation is 4080 ft. Site is off Forest Route 4445, 9 miles from its southern junction with Forest Route 331. U.S.G.S. Quad: Kootenai Falls 7.5 min. In Sect. 2, T31N, R33W. 48° 28' 50" lat., 115° 46' 32" long. See Map 3.

**Site description:** This is a rocky, cascading creek that flows down a 25° bed. The topographic map shows the creek extending ~1 mile up from the roadway and 2 miles below the roadway, draining into the Kootenai River. The site's condition was similar to what we observed when we searched here unsuccessfully on 17 May 1987. The 35° slopes rising from creekside are forested in PSME/PHMA grading into PSMA/SYAL and Scree. Fractured Belt rock is exposed at various places along the creekbed. Prominent trees include Pseudotsuga menziesii and Larix occidentalis, with some Tsuga heterophylla and Thuja plicata at creekside. Much of the

shrub growth over the creek had no foliage and could not be identified. Ribes sp. and Alnus sp. were prominent. Tree overstorey is up to ~90%, except near the roadway, which is open. Below the road the culverted water flows over riprap into deep forest ~30 m away. Above the road there is a bare, rocky reach that meanders through an ~20 m open area downstream from a dense overstorey of shrub (Photo 5). Approximately 100 m above the roadway there is an ~5 m high falls over a fractured Belt rockface (Photo 6). Bryophyte growth is dense at the falls and sparse in the open reach.

**Observations.** We found two salamanders during an ~40 minute search above and below the roadway. A juvenile was found among cobbles in the open area above the roadway, and a large female at the base of the falls. The creek was searched on 8 May at ~2:00 p.m. The sky was 25% overcast with the last rain on 7 May. Air temperature was 14°C and water temperature 7°C.

**Population:** There may be a good sized population here (possibly medium-large) dispersed along the creek's length. A survey is needed to determine the distance the creek is above ground.

#### Callahan Creek.

Kootenai National Forest in Bonner Co., Idaho. Kootenai River drainage. Salamanders found in a rocky seepage on an eastfacing roadcut ~7.5 miles due W of Troy. Elevation is 3200 ft. Site is on the W side of Forest Route 427, 11.1 miles from its junction with U.S. Highway 2. U.S.G.S. Quad: Mount Pend O'reille 15 min. In Sect. 22; T59N, R3E. 116° 3' 56" long., 48° 26' 47" lat. See Map 4.

**Site description:** This is a lightly flowing seepage on a well fractured Belt rockface ~6 m high. There are ~40 m<sup>2</sup> of damp area which includes a 1 m wide rubble pile at the base of the rockface (Photo 6). The 25°- 35° slopes surrounding and above the seepage are probably forested in PSME/SYAL grading into THPL series along Frezkat Creek, 30 m to the east. There is scant plant growth in the seepage and bryophyte mat covers ~10% of the surface. Prominent trees in the area are Pseudotsuga menziesii and Thuja plicata. Symphoricarpos albus, Alnus sp., and Acer sp. are locally common shrubs.

**Observations:** We found six salamanders here at ~noon, 14 May. The sky was 90% overcast with a light rain falling. Air temperature was 9°C, emergent water temperature 7°C. All the salamanders were found in the rubble at the base of the seepage within a 20 minute search.

**Population:** For the little material that could be moved for



searching this site, we found a fair number of salamanders. The extent to which the seepage dries is unknown but the potential exists for a medium sized population here. We searched many creeks and seepages in this drainage (Results Sect. 4; 36,37, 38,39,40,41,42,43) and found no salamanders. We feel that most of these areas have populations but were too cold and, in the case of the streams, too swollen to permit adequate search. It seems likely that the salamander will be found in the drainage of Callahan Creek on the Montana side of the border.

### Cougar Mine.

Private land in Sanders Co. Clark Fork River drainage. Salamander found in a mine shaft ~9 miles due NNW of Thompson Falls. Elevation is ~3000 ft. Site is on the E side of Forest Route 403 near the 1 mile marker. U.S.G.S. Quad: Thompson Falls 15 min. In Sect 35; R30W, T23N. 115° 24' 12" long., 47° 42' 48" lat. See Map 5.

**Site description:** There are two 2 m diameter mine shafts; 3 m apart on a westfacing rockface ~5 m from the roadway. These are at the base of a ~25° slope of bare rock extending ~50 m above the shafts (photo 7). To the north is an open, grassy slope with sparse growth of Holodiscus discolor and Physocarpus malvaceus. The surrounding habitat type is probably PSME/PHMA with Pseudotsuga menziesii and Pinus ponderosa the dominant trees. At the mouth of the shafts grow several Populus sp. The south shaft is flooded and a dense growth of Equisetum arvense is at the entrance (Photo 8). Approximately 50 m to the north of the shafts is a small cascading creek with an overstorey of Alnus sp. and Populus sp. Ground cover around the creek is mostly grasses and bryophyte mat. Much fractured bedrock is exposed in the area.

**Observations:** We visited the site at 4:30 p.m., 6 June. The sky was 25% overcast and the last rain had occurred on 5 June. Air temperature was 21°C outside the mine shaft. We found one salamander in the north shaft. Air temperature inside was 12.5°C. The specimen was found ~25 m in the in among cobbles mixed with fine dirt (Photo 9). The floor of the shaft is littered with stones and the walls are well fractured. We did not search the flooded mine shaft but we searched the creek to the north.

**Population:** There may be a large population here given the available microhabitat. This would make an excellent study site. A night search is needed.

### White Pine Creek.

Kaniksu National Forest in Sanders Co. Clark Fork River drainage. Salamanders found in a small seepage on a northfacing roadcut ~15 miles WNW of Thompson Falls. Elevation is 3200 ft. Site is on the SE side of Forest Route 215, 8.3 miles from its junction with State Highway 200. U.S.G.S. Quad: Cooper Gulch 15 min. In Sect. 24; T23N, R32W. 115° 34' 12" long., 47° 44' 29" lat. See Map 6.

**Site description:** This seepage is at the base of a clearcut that extends several hundred meters above the site on 15°-20° slopes (Photo 10). The nearest forested area on the south side of White Pine Creek is a stand of trees atop a large erosion bank ~60 m to the east. Trees in the area include Psuedotsuga menziesii, Larix occidentalis, Tsuga heterophylla, and Thuja plicata. The seepage rockface is ~6 m high. It is well fractured Belt rock with very scant bryophyte growth. There is no overstorey. Rock rubble and gravel have accumulated at the rockface base. Water drips from fractures in the rock and forms a very small dripzone of only ~4 m<sup>2</sup>. Atop the rubble pile there is some bryophyte cover with scant growth of ferns, grasses and forbs (Photo 11). This seepage almost appears ephemeral. The site is across the roadway from White Pine Creek ~25 m to the NW. The topographic map indicates this stream to be intermittent.

**Observations:** We found four neonatal salamanders here at 5:30 p.m., 5 June. The sky was 75% overcast and a light rain was falling. Air temperature was 20°C and emergent water 10°C. The four salamanders were under a single flat stone atop a ledge on the rockface.

**Population:** There is little suitable microhabitat locally. We searched another seepage in the area (Results Sec. 4; 56) without success. This drainage needs further survey and the site needs a night count. The population may be small.

### Simmons.

Property of Ed and Dorothy Simmons, who live near the site. Their mailing address is Box 121, Paradise 59856. Sanders Co., Clark Fork River drainage. Salamanders found along a NE facing falls ~1 mile WNW of Paradise. Elevation between 2600 and 2800 ft. Site is ~ 0.2 miles SW of a paved road on the S bank of the Clark Fork River, ~1.8 miles from its eastern junction with State Highway 200. U.S.G.S. Quad: Paradise 7.5 min. In Sect. 19; R25W, T19N. 114° 49' 35" long., 47° 23' 49" lat. See Map 7.

**Site description:** This is a ~100 m high series of waterfalls down a fractured Belt rockface that varies from near vertical to ~40° in slope. Water flow during our visit was light, similar

to late season flows at the Cascade Creek site. The extent of the splashzone on the rockface varies. Some reaches are as wide as ~12 m and in two places the bulk of the water passes beneath boulder piles and is reduced to a trickle above ground.

Bryophyte cover varies between 100% in some reaches and 10% in others. The falls originates in a spring at the base of a draw sloped ~20°. It ends by going underground in a boulder pile.

Water from the falls ends up in a farm pond to the north. A

spring-box is set up at the top of the falls with a relay near the base of the falls. The surrounding hillsides are open with grass and bryophyte ground cover. The dominant trees are Pseudotsuga menziesii and Pinus ponderosa. Habitat type is in the PSME series. Shrub growth includes Physocarpus malvaceus, Holodiscus discolor, Acer glabrum, Symphoricarpos albus, and Philadelphus lewisii. There is little overstorey over most of the falls (Photo 12, 13).

**Observations:** We collected four salamanders in lower reaches of the falls at ~noon, 7 June. The sky was 25% overcast. Air temperature was 22°C and the temperature of water in the falls was 7°C.

**Population:** There is a considerable area of suitable microhabitat here and the potential exists for a very large population. Our search here was fairly short (20 min.) and we easily found salamanders. The Simmons informed us that salamanders have clogged their water system in the past.

### Paradise.

Lolo National Forest in Sanders Co. Clark Fork River drainage. Salamanders found in a small, NE facing seepage on a roadcut ~0.5 miles due W of Paradise. Elevation is 2500 ft. Site is on the SW side of a road on the S bank of the Clark Fork River, 0.9 miles from its eastern junction with State Highway 200 (Photo 14). U.S.G.S. Quad: Paradise 7.5 min. In Sect. 20; T19N, R25W. 114° 48' 32" long., 47° 23' 20" lat. See Map 7.

**Site description:** This seepage is near the base of a 20 m high vertical roadcut of fractured Belt rock. The cut breaks slopes of ~25° forested in PSME/PHMA. The dominant trees are Pseudotsuga menziesii and Pinus ponderosa. Physocarpus malvaceus, Symphoricarpos albus, and Philadelphus lewisii are prominent shrubs. The surrounding forest is immature and fairly open. The seepage is across the road easement from the Clark Fork River and at the time of our visit was a few m above river level. The roadcut rockface extends ~50 m along the roadway on both sides of the seepage. This seepage almost seems temporary. It comprises a dripzone of ~10 m<sup>2</sup>. There is a rubble pile at the base of the rockface that has a scanty ground cover of mostly

grasses. There is little bryophyte growth in the seepage and no overstorey. Immature Pseudotsuga grow nearby.

**Observations:** We found five salamanders here at ~4 p.m., 7 June. The sky was 75% overcast, air temperature was 21°C, and water in the seepage was 10°C. Most of the salamanders were found when we dislodged a large rock fragment, opening up fractures.

**Population:** Salamanders are easily found, indicating a good sized population for the small area of microhabitat. A night count is needed. Salamanders here may rely upon the river water for moisture in the fractures they inhabit. The surrounding hills should be checked for more populations as this region seems to have a good water table.



**Results of Study, Section 2. Historic site visits.**

**Troy 2.** Noon, 9 May. 100% overcast with the last rainfall occurring 7 May. Air 16°C, emergent water 8°C. We noted no change in site condition since our last visit.

We found four salamanders in the culverted runoff just north of the highway. The mossy seepage south of the highway, and the runoff just north of the highway. The mossy seepage south of the highway, and the runoff north of the rail easement were searched without success. The salamander distribution we encountered is similar to what we have found in the past.

**Troy 1a.** Noted conditions at ~8:15 p.m., 8 May. 0% overcast with the last rainfall occurring 7 May. Air 17°C, emergent water 7°C. We noted no change in site condition since our last visit. Searched for salamanders at ~10:30 p.m., 8 May. 0% overcast. Air 11.5°C, emergent water 7°C. We observed no salamanders here. This is consistent with past observations.

**Troy 1b.** 7:50 p.m. 0% overcast with the last rainfall occurring 7 May Air 17°C, emergent water 7°C. Surveyor's marks on the rockface were noted. Some of the tree overstorey at the westernmost seepage had been cut back, presumably by highway workers. Debris from a recent train derailment littered the area at the base of the rockface. We noted slightly less wet area within the seepages than in past years.

Because we wanted time to night-search other sites in the area (Troy 1a, 1c, 1d, 1e; Surprise Gulch), and because we have done considerable nighttime work at Troy 1b in the past, we did not night-search this site. We looked for salamanders during our examination of site conditions and found eleven in ~15 minutes. Most of these were caught in the middle and easternmost seepages, a pattern consistent with past observations.

**Troy 1c.** Noted conditions at ~8:20 p.m., 8 May. 0% overcast with last rainfall occurring 7 May. Air 17°C, emergent water 7.5°C. There was a slight decrease in water at the site since our last visit. Moisture on the slope above the site was less apparent and the pool at the base of the seepage had decreased in area by ~20%. We night-searched at 9:40 p.m., 8 May. 0% overcast. Air 14°C, emergent water 7.5°C.

We counted 13 salamanders, all in the rocky area behind the chain link. This is consistent with past observations, although on rainy nights we have counted up to 50 salamanders here.

**Troy 1d.** Noted conditions at ~8:30 p.m., 8 May. 0% overcast with the last rain on 7 May. Air 17°C, emergent water 7°C. We noted no change in site condition since our last visit. We night-searched at approximately 10:00 p.m., 8 May. 0% overcast.

Air 14°C, emergent water 7°C.

We observed nine salamanders here, all near rocky outcroppings in the seepage area. This is similar to past observations.

**Troy 1e.** Noted conditions at ~8:35 p.m., 8 May. 0% overcast with the last rain on 7 May. Air 17°C, emergent water 7°C. We noted no change in site condition since our last visit. We night-searched at approximately 10:20 p.m., 8 May. 0% overcast. Air 12°C, emergent water 7°C.

We counted 29 salamanders. This number is consistent with past observations under similar climatic conditions.

**Troy 3.** 7:15 p.m., 8 May. 0% overcast with the last rain on 7 May. Air 15°C, emergent water 7°C. Slightly less water was noted. There was no runoff down the road easement below our old capture site; water percolated through the roadbed at the seepage.

At our old capture site we found five salamanders, all in the same small drip zone as last year. We also found salamanders to the west of our original capture site along the roadbed. Three were found in a seepage ~15 m distant, one ~30 m distant, and another four were found in a seepage ~80 m distant. Our not finding salamanders here in 1986, plus the small number we encountered last year, prompted our speculation that the population here may be small-medium in size. We now suspect the population around this site may be quite large and well dispersed. A night count along the road is needed.

**Troy 4.** ~1:00 p.m., 9 May. 100% overcast with the last rain on 7 May. Air 16°C, emergent water 7°C. We noted no change in site since the last visit. We found no salamanders.

**Troy 5.** 6:25 p.m., 8 May. 50% overcast with the last rain on 7 May. Air 14°C, water 6°C. Water level in stream was similar to that observed last spring. There was no other change noted.

We found two salamanders ~10 m upstream from the highway in a ten minute search. The ease with which we found specimens supports our speculation that this may be a large population.

**North Troy 1.** 11:05 a.m., 8 May. 0% overcast with last rain on 7 May. Air 11.5°C, water 7.5°C, substrate at original capture site 9°C. Water flow at the site is similar to what we observed last spring. A trailer is in place (no one home during our visit) ~5 m from the stream near the original capture site. A logging operation appears to have taken cover from part of the upper drainage of the stream but in the area around the capture site the clearcut does not come within 40 m of the southeast bank (Photo 15).

We searched for ~30 minutes in the area around the original capture site and found no salamanders. Although the local human activity may be affecting salamanders here, such impact will be difficult to detect given the apparent small size of the population

**Keeler Creek.** 6:35 p.m., 7 May. 100% overcast with very light rain. Air 15°C, water 8°C. Water level similar to that of last spring. We searched the area around the bridge but found no salamanders. We also checked under debris on the perimeter of the nearby beaver pond for Ambystoma. We found none.

**Surprise Gulch.** We performed a day-search of the area below the road and a night-search of the area above the road on 8 May. The last local rainfall occurred 7 May. At ~1:00 p.m. the sky was 0% overcast. Air 12°C, water 9°C. We noted little change in the area since our last visit. At 11:30 p.m. the sky was 0% overcast. Air 10°C, water 5°C.

During our day-search we found four salamanders in a few minutes of search beneath the culvert. During our night-search we counted four adult salamanders along 25 m of stream above the road. We also searched damp talus along the roadway just south of the creek and the area where Surprise Creek goes underground near a crossing of the road ~ 0.5 miles downstream. We found no salamanders in either of the latter.

The best Coeur d'Alene Salamander habitat along the portion of the stream we inspected is the splashzone over riprap below the road. Our night observations show a salamander dispersion similar to what we have seen in other stream populations (e.g. Troy 5, Noxon).

**Big Hoodoo Mountain.** ~5 p.m., 8 May. 60% overcast with last rainfall 7 May. Air 12.5°C, water 6.5°C. Along the roadway, little seems changed in the three creeks of this site since our last visit. Water levels are the same. The (formerly) pristine stream that we have assumed to be the historical site has been substantially altered. A clearcut along the west bank of the creek begins ~100 m upstream from the road and extends along the creek for ~200 m (Photo 17).

We searched ~100 m of stream in the historical site and seepages in the upper drainages of the two creeks to the west. We found no salamanders. Dick Wallace has informed me that Jim Lynch may have found the salamander here after trying unsuccessfully many times. He'll check this out further for us.

**Yaak Falls.** 9:15 a.m., 8 May. 0% overcast with the last rain on 7 May. Air 12°C, substrate in seepages 14°C. No change in site conditions were noted except for slightly more dampness in the seepages and on the surrounding rockfaces.

We found one salamander in each of the two seepage areas. We also searched surrounding damp areas without success. As we found last year, the population here seems isolated to the area around our original capture site (Photo 16). There is little moveable debris in this site and a night search is needed to estimate the population size.

**Koocanusa 1.** Noted conditions at ~3:00 p.m., 9 May. 75% overcast with last rain 7 May. Air 15°C, emergent water 7°C. Little has changed at this site since our visit last year. The water level is similar to that which we observed last August (Photo 18).

We searched the site at ~12:30 a.m., May 10. 0% overcast. Air 12.5°C, emergent water 4.5°C. We observed two adult salamanders. Both were found on the vertical rockface. We suspect the population is larger than is indicated by this low night-count. The low substrate temperature in the seepage could have resulted in fewer animals above ground. A night-count during more favorable weather is needed.

**Koocanusa 2a.** Noted conditions at ~3:30 p.m., 9 May. 50% overcast with last rain 7 May. Air 14°C, water 7.5°C. During our August 1987 visit to this site the seepage was almost completely dry. The moisture level during our recent visit was similar to that observed last spring (Photo 19). We searched the site at ~midnight, 9 May. 0% overcast. Air 13°C, emergent water 6°C.

We observed one neonate salamander in a rock crevice during our site evaluation. Four salamanders were seen at night. This is likely a small population, given the low count under favorable conditions. This may be attributable to the fluctuation in moisture we have observed here.

**Koocanusa 2b.** Noted conditions at ~3:45 p.m., 9 May. 50% overcast with last rain on 7 May. Air 15°C, emergent water 7°C. There has been little change in this site, except for the amount of damp area, since our visit last August. There was probably twice as much wet rock in the area during our recent visit than during the August 1987 visit, but ~50% less than what we observed last spring. We searched the site at 11:30 p.m., 9 May. 0% overcast. Air 13°C, emergent water 6°C.

We observed 14 salamanders during our night-count. Only two were encountered in the area that is perennially damp. Probably more salamanders could be found during wetter weather. We feel this is a small-medium sized population.

**Koocanusa 2c.** Noted conditions at ~4:00 p.m., 9 May. 20% overcast with last rain on 7 May. Air 14°C, water 5.5°C. Water level in this stream was similar to what we encountered last



spring. No change in any condition of the site, except for water level, was noted. We searched for salamanders along ~25 m of streambed at ~11:00 p.m., 9 May. Air 13°C, water 4.5°C.

We found no salamanders during our night search. We attribute this to the cold. Our ability in the past to easily find salamanders here indicates there may be a good sized population. Night work during more favorable conditions is needed. We searched several apparently temporary seepage areas between the Kooconusa 2c and Kooconusa 3 sites during the night of 9 May and found no salamanders.

**Kooconusa 3.** Noted conditions at ~4:20 p.m., 9 May. Air 14°C, water 6°C. Water level similar to what we encountered last spring and is ~30% greater than what we observed last August (Photo 21). Aside from the fluctuation of water level in the stream, there were no observable changes in the site. We searched for salamanders along ~25 m of streambed at ~10:30 p.m., 9 May. 0% overcast. Air 9°C, water 5.5°C.

We found three salamanders. It is likely that we saw fewer than we would under more favorable (warmer) conditions. We feel the population here may be medium large.

**Noxon.** We noted conditions at ~2:00 p.m., 7 May. 100% overcast with light rain. Air 11°C, water 6°C. Little difference in water flow was seen. There was not much development of plant undergrowth. A night-search was performed at 10:15 p.m. 4 June. 90% overcast with light rain falling. Apparently little rain in the region recently but some rain occurred 3 June. Air 18°C, water 9°C.

On 7 May we found one salamander in the cascading portion of the creek below the dam and three individuals in damp, mossy talus at the base of the roadside cliffs where we found salamanders last year (Photo 22). We also found a long-toed salamander (Ambystoma macrodactylum) here. Between the roadway and the talus we found a dessicated (dead) Coeur d'Alene salamander. No mechanical damage to the salamander was apparent and it seems that this individual may have been caught above ground under dessicating conditions. Last year during a night count in this area we observed considerable salamander movement along the roadway.

On 4 June we observed six salamanders along ~25 m of the cascading portion of the creek but none in the talus slope. Conditions in the talus were drier than during our 7 May visit.

Apparently the stream in this site extends uphill for a greater distance than we suspected earlier. On 7 May we found a cascade ~30 m uphill from, and to the south of, the point at which we originally reported the stream's emergence. This cascade is fed

by a reach of stream further uphill. The stream goes into a culvert below the cascade. This cascade is in a clearcut powerline easement. We searched it and the stream uphill without success.

**Thompson 1a.** ~1:00 a.m., 7 June. 0% overcast with last rain on 5 June. Air 15°C, emergent water 7°C. Conditions in the seepage were very similar to what we observed during our visit last spring.

We counted five salamanders climbing the bryophyte mat on vertical rock. Three were found in the southern seepage and two in the one to the north. As we mentioned in our original report, this seepage is difficult to search, given the dense plant growth. We were able to find a greater number of salamanders than last year, probably because of better climatic conditions. It may be that the population here is larger than we originally suspected.

**Thompson 1b.** ~12:30 a.m., 7 June. 0% overcast. Air 15°C, water 7°C. Conditions in the seepage were similar to what we observed last spring.

We observed five salamanders here, all climbing bryophyte mat. We also found one tailed frog (Ascaphus truei) in talus below the seepage rockface. As with the Thompson 1a site we observed a greater number of salamanders than we did last year under less than optimal conditions. The dense bryophyte mat here may make it difficult to observe active salamanders. The population here may be larger than we once suspected. In addition to night-searching the Thompson 1a and 1b sites, we also night-searched a large seepage area on the East Thompson River Road, 15.9 miles from its junction with State Highway 200 (1987 report; R3, 52). We have night-searched this area before without success. At ~midnight, 6 June, air temperature was 15°C and water 6°C. We again found no salamanders.

**Priscilla Gulch.** 10:50 p.m., 6 June. 0% overcast with last rain on 5 June. Air 14.5°C, water 7.5°C. Water level in the stream was similar to what we observed last spring. Little has changed since our last visit. We found seven salamanders along ~30 m of creek above the road. This indicates a greater population here than we originally suspected. Our former searches may have been performed during less favorable climatic conditions. The fact that we were not taking data for each individual salamander we encountered may have contributed to our finding more salamanders this year than last.

**Barktable Creek.** 11:40 p.m., 6 June. 0% overcast with last rain on 5 June. Air 14°C, water 6°C. Water level in the creek was similar to what we encountered last spring. There was considerably more deadfall in the creek than last year and much

more dense growth of nettles.

We found no salamanders here during a search of ~25 m of the creek above the road. Conditions along the streambed likely hampered our search efforts. This stream is so similar to Priscilla Gulch that we feel the population here must be similar.

**Sims Creek.** 10:00 a.m., 6 June. 50% overcast with last rain on 5 June. Air 14.5°C, water 5°C. Water flow ~30% greater than we observed last spring. The sound of flowing water was apparent ~3 m up the roadcut slope from our original capture site, indicating a larger damp area close to the surface than we originally suspected. There may be considerable fracturing of bedrock immediately below the loose rock of the seepage. There was no change in any other site condition.

We searched the original capture site and the runoff from the seepage between the capture site and Sims Creek. We found only one salamander which we encountered in the first few minutes of our 40 minute search. We also found a young Ascaphus in cobbles at the original capture site. It may be that the water was too cold in the seepage. A night search is needed at this locality to determine the size and extent of the salamander population.

**Cougar Gulch.** 3:30 p.m. 6 June. 25% overcast with last rain on 5 June. Air 20°C, water 8°C. There was little change in the site's condition since our last visit. Water flow was similar to that we observed last May.

We were able to find only one salamander here in a 25 minute search. A night search is needed here to establish the population's size. The extent of suitable microhabitat here is less than we first thought. We drove up F.R. 403 to a point in Cougar Gulch ~0.3 miles above the capture site and found no water.

**Big Beaver Creek.** We noted site conditions at ~4:00 p.m., 5 June. 50% overcast with last rain on 4 June. Air 21°C, water 8°C. Water flow in the seepage identical to that observed in our last visit. There was no notable change in site condition. Water was flowing in Big Beaver Creek. Because this is such an unusual location for the salamander we performed a night count at 11 p.m., 5 June. 100% overcast with rainfall earlier in the day. Air 12°C, emergent water 8°C.

We searched gravel during the day on 5 June and found three salamanders. Care was taken not to greatly disturb the area in anticipation of our night-search. During the night search we counted two adult salamanders and two immatures in the damp areas of the seepage. We had not previously encountered adults at this site. Except for one immature salamander on bryophyte mat, all were found on bare gravel. One of the adults had just

captured an adult caddisfly. A night search is needed here during cool, very rainy weather in order to assess the population. There is a possibility that our daytime activity at the site influenced the number of animals we observed at night. The population here seems small.

**Cascade Creek.** 10:00 a.m., 8 June. 100% overcast with heavy rainfall. Air 10°C, water 5.5°C. Water flow was similar to what we encountered last spring: ~80% greater than last August (Photo 23). We found little other change in the site. Because the trail became dangerously slippery adjacent to the falls as we worked, we searched only the two upper falls.

At the base of the upper of the two falls, we found six individuals. At the base of the lower falls we found two. All were encountered in a heavy sprayzone. The numbers of salamanders we encountered here are similar to last year's. We feel this may be a very large population.

**Trout Creek.** 3:00 p.m., 8 June. 100% overcast with heavy rainfall in an electrical storm. Air 9°C, emergent water 7°C. There was no change in this site except for the water flow being ~10% greater than we encountered last August.

We searched both seepages. One immature salamander was found under the first pebble lifted. We found no more in a ~20 minute search. A night count is needed here.

**Woodman Creek.** ~3:30 p.m., 11 June. 50% overcast with last rain on 8 June. Air 18°C, water at first crossing of creek 8.5°C. We noted little change in the area since our last visit. The habitat type here may be PSME/PHMA. In our original report we indicated the dominant tree above the creek to be Pinus ponderosa. This is true only in the mouth of Woodman Creek Canyon. The dominant tree further upstream is Pseudotsuga menziesii.

We searched for salamanders at creekside 2.1 miles and 3.4 miles (Photo 24,25) from the Woodman Creek Road's junction with U.S. Highway 12. We found none.

**Sweathouse.** ~10:00 p.m., 9 June. 0% overcast with last rain on 8 June. Air 19°C, water 6.5°C. Aside from a greatly increased water flow, there was little change in the site. We have reassessed the habitat at this site. The following should replace that of our original report.

The habitat type is in the PSME series with dominant trees Pseudotsuga menziesii, Pinus ponderosa, Pinus contorta, and Larix occidentalis. Prominent shrub growth away from the creekbed includes Spiraea betulifolia, Rosa sp., Vaccinium sp., Ribes sp., Physocarpus malvaceus, and Philadelphus lewisii. Bunch grasses



and Xerophyllum tenax are common ground cover in open areas. Streamside growth includes Betula sp., Acer glabrum, Populus sp., and immature conifers.

The water flow at the falls was considerably greater than during our last visit. The resulting sprayzone from the falls extended ~80 m downstream on the south side of the creek. We searched both sides of the creek below and above the falls but were unable to locate salamanders. As was the case last year, we were hampered by a lack of moveable debris under which to search. A night count is needed at this site. The best time would be in the early fall when the stream level is lower. A night count earlier may be dangerous. We feel the likelihood of a large population here is great.

### Results of Study, Section 3. Salamander observations.

Table 1 characterizes substrates associated with adult (A) and immature (I) Coeur d'Alene salamanders observed during day counts in this study. Pertinent site data and climatic observations are provided in Results, Sections 1 and 2. The Dumas wetness index is reported as: 1 -- damp, substrate only discolored by moisture; 2 -- moist, minute water droplets visible on substrate; 3 -- wet, thin film of water covering substrate; 4 -- very wet, puddles of water or water flowing over substrate. This index is further described in the Materials and Methods section of the 1987 report. The substrate type denotes the type of material immediately associated with the salamander. Gravel indicates rock fragment diameter > 0.5 cm but < 4 cm. Rock indicates fragment diameter > 4 cm but < 20 cm.

<u>Site</u>	<u>Age</u>	<u>Wetness</u>	<u>Temp. °C</u>	<u>Substrate</u>
Pipe Creek	A	2	11.0	Rock
	I	3	12.0	Rock
	I	3	11.0	Rock
	I	3	11.0	Rock
Koot Creek	A	3	8.0	Rock/Bryophyte
	I	2	11.0	Rock
Callahan Creek	I	2	7.0	Gravel
	I	2	7.0	Gravel
	I	2	8.0	Bryophyte
	I	2	7.0	Rock
	I	2	7.0	Rock
	I	2	7.5	Rock
Cougar Mine	A	2	9.0	Rock/Dirt
White Pine Creek	I	2	13.0	Rock
	I	2	13.0	Rock
	I	2	13.0	Rock
	I	2	13.0	Rock
Simmons	A	2	14.0	Rock
	A	3	12.0	Bryophyte
	I	3	14.0	Bryophyte
	I	2	14.0	Bryophyte
Paradise	A	2	12.0	Fracture
	A	3	13.0	Fracture
	I	2	12.5	Fracture
	A	2	12.0	Rock
	I	1	12.0	Rock

<u>Site</u>	<u>Age</u>	<u>Wetness</u>	<u>Temp. °C</u>	<u>Substrate</u>
Troy 2	A	3	9.0	Gravel
	I	3	11.0	Gravel
	I	2	9.0	Bryophyte
	I	3	9.0	Gravel
Troy 1b				
West seep	A	3	8.0	Bryophyte
	A	3	7.0	Gravel
	A	2	8.0	Rock
Middle seep	A	3	10.1	Rock
	I	2	9.5	Gravel
	I	2	9.5	Rock
	I	3	8.5	Rock
East seep	I	3	8.0	Gravel
	I	2	8.0	Rock
	I	3	8.5	Bryophyte
	I	3	10.0	Bryophyte
Troy 3				
Old capture site				
	A	3	9.0	Gravel/Bryophyte
	I	3	9.0	Gravel/Bryophyte
	I	2	9.5	Gravel/Bryophyte
	I	2	9.0	Gravel/Bryophyte
	I	2	9.0	Gravel/Bryophyte
Seeps to west				
	I	2	12.0	Gravel/Bryophyte
	I	2	12.0	Gravel/Bryophyte
	I	2	12.0	Gravel/Bryophyte
	I	3	9.0	Gravel
	A	3	7.5	Gravel
	A	3	7.5	Gravel
	I	3	7.5	Gravel
	I	3	9.5	Gravel
Troy 5				
	I	3	9.0	Gravel
	I	2	10.0	Gravel
Surprise Gulch				
	I	3	12.0	Rock
	I	3	12.0	Rock
	A	2	14.0	Bryophyte
	I	2	14.0	Rock
Kooconusa 2a				
	I	2	6.0	Crevice
Yaak Falls				
	I	2	14.0	Rock
	I	3	14.0	Rock

<u>Site</u>	<u>Age</u>	<u>Wetness</u>	<u>Temp. °C</u>	<u>Substrate</u>
<b>Noxon</b>				
Creekside	I	2	7.0	Log
Talus	I	2	14.0	Rock/Bryophyte
	I	2	14.0	Rock/Bryophyte
	I	2	14.0	Rock/Bryophyte
<b>Sims Creek</b>	I	1	7.0	Rock
<b>Cougar Gulch</b>	I	2	10.0	Rock
<b>Big Beaver Creek</b>				
	I	3	13.0	Gravel
	I	3	13.0	Gravel
	I	3	13.0	Gravel
<b>Cascade Creek</b>				
Fall 1	I	2	9.0	Bryophyte
	A	2	8.0	Bryophyte
	I	2	9.0	Bryophyte
	I	2	9.0	Bryophyte
	I	2	7.5	Bryophyte
	I	2	7.5	Bryophyte
Fall 2	A	3	7.0	Rock
	I	3	7.0	Rock/Bryophyte
<b>Trout Creek</b>	I	1	7.0	Gravel

**Results of Study, Section 4. Where we didn't find them.**  
(Numbers correspond to those on Map 8.)

1. Keeler Creek site.
2. Rocky seepages on W. side of Hwy. 508, ~0.3 miles N. of Yaak Falls (original report; Sect. R3, 6). 0% O.C. Air 14°C, H<sub>2</sub>O 8°C. 10:00 a.m., 8 May.
3. North Troy 1 site.
4. Big Hoodoo Mountain site.
5. Falls Creek. Mossy, cascading stream with small falls in Thuja forest ~1 mile due E of Savage Lake (Original report; Sect. R3, 18). 100% O.C. Air 8°C. H<sub>2</sub>O 5.5°C. 10:30 a.m., 9 May.
6. Troy 4 site.
7. Mossy, cascading creek in Thuja forest on F.R. 402, ~0.8 miles SW from Cedar Creek bridge. 75% O.C. Air 15°C. H<sub>2</sub>O 6°C. 1:45 p.m., 9 May.
8. Rocky seepage on W side of F.R. 228, 32.9 miles from its junction with Hwy. 37. 0% O.C. Air 13°C. H<sub>2</sub>O 7°C. 10:20 p.m., 9 May.
9. Little North Fork Falls. Heavily flowing falls in deep, shady gorge of mossy, fractured rock ~0.5 miles upstream from F.R. 336. 0% O.C. Air 14°C. H<sub>2</sub>O 7°C. 6 p.m., 9 May.
10. Mossy stream in clearcut at ~3000 ft. elev. on F.R. 835, ~3.3 miles from its junction with Hwy. 37. 0% O.C. Air 21°C. H<sub>2</sub>O 9°C. 11:30 a.m., 10 May.
11. Cascading mossy creek in Betula at ~3000 ft. elev. on F.R. 6277 via F.R. 48, 6.7 miles from its junction with Hwy. 37. 0% O.C. Air 20°C. H<sub>2</sub>O 7°C. 12:30 p.m., 10 May.
12. Pinkham Falls. Heavily flowing falls in deep but open gorge of fractured rock (Photo 26). Location on Forest Service map is incorrect. ~4 miles due S. of Rexford. 0% O.C. Air 16°C. H<sub>2</sub>O 6°C. 7 p.m., 10 May.
13. Rocky, mossy seepage in Betula at ~2700 ft. elev. on Hwy 37, 0.3 miles S of mile marker 48 (original report; Sect. R3, 24). Two Ambystoma macrodactylum found. 0% O.C. Air 14°C. H<sub>2</sub>O 6.5°C. 10 p.m., 10 May.
14. Slick rock seepage at ~2700 ft. elev. On Hwy. 37, 0.3 miles N of mile marker 43. 0% O.C. Air 14°C. H<sub>2</sub>O 6.5°C. 10:30 p.m.,



10 May.

15. Rocky, mossy seepage in Betula at ~2700 ft. elev. on Hwy. 37 0.8 miles N of 42 mile marker. 0% O.C. Air 14°C. H<sub>2</sub>O 6°C. 10:50 p.m., 10 May.

16. Tweed Creek. Falls over fractured rock at ~2700 ft. elev. on Hwy 37 0.3 miles N of 42 mile marker (Original report; Sect. R3, 25). 0% O.C. Air 13.5°C. H<sub>2</sub>O 6°C. 11:10 p.m. 10 May (Photo 27)

17. Slick rock seepage at ~2700 ft. elev. On Hwy 37 0.3 miles N of mile marker 43. 0% O.C. Air 13.5°C. H<sub>2</sub>O 6°C. 11:30 p.m., 10 May.

18. Cobbly, mossy brooklet at ~2700 ft. elev. on Hwy. 37 0.5 mile N of mile marker 35. 0% O.C. Air 13.5°C. H<sub>2</sub>O 6°C. 11:50 p.m., 10 May.

19. Mossy, cascading creek in Tsuga at ~3400 ft. elev. on F.R. 68, 19.7 miles from its junction with Hwy. 37. 0% O.C. Air 11°C. H<sub>2</sub>O 6°C. 11:50 a.m., 11 May.

20. Boggy seepage at ~3500 ft. elev. On F.R. 68, 20.2 miles from its junction with Hwy. 37. 0% O.C. Air 11°C. H<sub>2</sub>O 6.5°C. 12:40 p.m., 11 May.

21. Mossy, cascading creek in Thuja near fractured rockface at ~3700 ft. elev. On F.R. 68, 21.4 miles from its junction with Hwy. 37. 0% O.C. Air 11.5°C. H<sub>2</sub>O 6°C. 1:00 p.m., 11 May.

22. Boggy, mossy seepage near exposed fractured bedrock at ~4000 ft. elev. on F.R. 757, 3.9 miles from its junction with F.R. 92. 0% O.C. Air 24°C. H<sub>2</sub>O 5°C. 3:30 p.m., 11 May.

23. Mossy, cascading creek in Larix near outcrop of fractured bedrock at ~4200 ft. elev. On F.R. 92 ~0.5 miles SW of its junction with F.R. 14188. 0.7 mile past mile marker 55. 75% O.C. Air 22°C. H<sub>2</sub>O 6°C. 4:30 p.m., 11 May.

24. Mossy, cascading creek in Thuja at ~4000 ft. elev. on F.R. 92, near mile marker 65. 50% O.C. Air 21°C. H<sub>2</sub>O 6.5°C. 5:00 p.m., 11 May.

25. Lydia and Sieminski Creeks. Both at ~4400 ft. elev. Mossy, cascading streams with some freestone reaches. In Pseudotsuga forest. On F.R. 856, 3.1 and 3.9 miles S of its junction with F.R. 1900. 50% O.C. Air 18.5°C. H<sub>2</sub>O 6°C. 6:50 p.m., 11 May.

26. Cobbly, mossy brooklet in Alnus at ~2100 ft. elev. on F.R. 36, 2.8 miles from its junction with Hwy 37. 0% O.C. Air

18.5°C. H<sub>2</sub>O 6°C. 9:00 a.m., 12 May.

27. Little Bitterroot Falls. Heavily flowing falls in fractured Beltrock canyon at ~ 3800 ft. elev. Falls is ~5 miles due S of Little Bitterroot Lake (1987 report: Sect. R3, 44). 10% O.C. Air 21°C. H<sub>2</sub>O 8°C. 2:00 p.m., 12 May (Photo 28)

28. Mossy, cobbly creek in Betula, Cornus, and Acer at ~2900 ft. elev. On Hwy. 35 (E. shore of Flathead Lake), 0.3 miles N. of mile marker 25. 0% O.C. Air 25.5°C. H<sub>2</sub>O 6°C. 4:00 p.m., 12 May.

29. Mauzey Creek and seepages at approximately 2900 ft. elev. Creek is mossy and cascading, seepage is mossy and gravelly. In Pseudotsuga forest with Cornus, Betula, and Acer. On Hwy 35 approximately 1.5 miles N of Crane Creek. 0% overcast. Air 25.5°C. H<sub>2</sub>O 6°C. 4:45 p.m., 12 May.

30. Crane Creek vicinity at approximately 2900 ft. elev. Three mossy, cascading creeks and one bare rock seepage in Pseudotsuga forest with Cornus, Acer, Salix, and Betula. On Hwy 35 near mile marker 23. 0% O.C. Air 26°C. H<sub>2</sub>O 6°C. 5:30 p.m., 12 May.

31. Cobbly creek with some freestone in Pseudotsuga forest at ~2900 ft. elev. with Cornus, Acer, and Betula. On Hwy. 35, 0.7 miles N of mile marker 11. 0% O.C. Air 26°C. H<sub>2</sub>O 6.5°C. 6:15 p.m., 12 May.

32. Mossy seepage on road cut at ~2900 ft. elev. Sparse shrub growth. On Hwy. 35, 0.1 mile N of mile marker 11. 0% O.C. Air 27°C. H<sub>2</sub>O 10°C. 6:45 p.m., 12 May.

33. Mossy seepage on fractured rockface at ~2900 ft. elev. Overgrown in Betula, much rocky debris. Also a cobbly brooklet ~40 m to S. on Hwy. 35, 0.2 miles S of mile marker 11. 0% O.C. Air 26°C. H<sub>2</sub>O 7°C. 7:30 p.m., 12 May.

34. Two mossy, cascading creeks at ~3700 ft. elev. in Thuja with Alnus. On F.R. 762, 6.2 and 6.5 miles from its junction with F.R. 763. 100% O.C. Air 14.5°C. H<sub>2</sub>O 5°C. 2:00 p.m., 13 May.

35. Three small, cascading creeks in dry Pseudotsuga forest. On F.R. 4769 at 3.4, 4.0, and 6.7 miles from its junction with F.R. 533 SSE of Libby. 75% O.C. Air 14°- 15°C. H<sub>2</sub>O 6°C. 5:00 p.m., 13 May.

36. Small, rocky seepage with some moss at ~2100 ft. elev. On F.R. 427, 0.4 mile from its junction with Hwy. 2 within Troy city limits. 100% O.C. Air 9.5°C. H<sub>2</sub>O 6°C. 10:00 a.m., 14 May.

37. Cobbly creek with little moss at ~3500 ft. elev. Sparsely

covered in Salix, Acer, and Alnus. On F.R. 427 near mile marker 10. 100% O.C. Air 9°C. H<sub>2</sub>O 5°C. 11:00 a.m., 14 May.

38. Small mossy creek in Thuja with Acer and Alnus. On F.R. 427, 10.7 miles from its junction with Hwy. 2. 100% O.C. Air 9°C. H<sub>2</sub>O 5°C. 11:30 a.m., 14 May.

39. Frezkat Creek (Idaho). Cascading creek in Thuja. On F.R. 427, 11 miles from its junction with Hwy. 2. 90% O.C. Air 9°C. H<sub>2</sub>O 5°C. Noon, 14 May.

40. Rocky creek/seep with scant moss at ~3300 ft. elev. With some cover from Populus. On F.R. 427, 10.3 miles from its junction with Hwy. 2. 100% O.C. with rain. Air 10°C. H<sub>2</sub>O 6°C. 1:00 p.m., 14 May.

41. Jill Creek at ~3300 ft. elev. Heavily cascading stream with much moss in Thuja and Tsuga. On F.R. 427, 9.5 miles from its junction with Hwy. 2. 100% O.C. Air 10°C. H<sub>2</sub>O 5°C. 1:20 p.m., 14 May.

42. Mossy creek at ~3200 ft. elev. in Thuja and Tsuga. On F.R. 427, near mile marker 8. 100% O.C. with rain. Air 10.5°C. H<sub>2</sub>O 5°C. 1:50 p.m., 14 May.

43. Cascading, mossy creek at ~3200 ft. elev. in Thuja and Tsuga. On F.R. 427, 7.4 miles from its junction with Hwy. 2. 90% O.C. Air 10.5°C. H<sub>2</sub>O 0.5°C. 2:20 p.m., 14 May.

44. Boggy seepage over riprap at ~3100 ft. elev. Heavy with Alnus in Thuja and Tsuga. On F.R. 414, just S of its crossing of the South Fork of Callahan Creek. 75% O.C. Air 12°C. H<sub>2</sub>O 6°C. 2:45 p.m., 14 May.

45. Madge Creek and adjacent boggy seepage at ~4300 ft. elev. in clearcut. Creek is heavily cascading with Thuja in bed. On F.R. 69, 6.4 miles from its junction with Hwy. 56. 100% O.C. Air 8°C. H<sub>2</sub>O 6°C. 4:00 p.m., 14 May.

46. Small mossy creek at ~3600 ft. elev. in old clearcut. On F.R. 691, 2.1 miles from its junction with Hwy. 56. 100% O.C. Air 9°C. H<sub>2</sub>O 6°C. 4:20 p.m., 14 May.

47. Dead Horse Creek. Mossy, cascading stream in Tsuga and Thuja at ~2200 ft. elev. On F.R. 2292, near mile marker 3. 30% O.C. Air 24°C. H<sub>2</sub>O 11.5°C. 2:30 p.m., 4 June.

48. Gravelly creek in Thuja at ~2200 ft. elev. On F.R. 2292 at mile marker 2. 20% O.C. Air 24°C. H<sub>2</sub>O 11°C. 3:00 p.m., 4 June.

49. Gravelly creek in Pseudotsuga and Thuja at ~2200 ft. elev. On F.R. 2292, 0.1 mile W of mile marker 1. 30% O.C. Air 24°C. H<sub>2</sub>O 11°C. 3:20 p.m., 4 June.

50. Mossy, cascading creek in Tsuga at ~3000 ft. elev. Stream crosses F.R. 410 on switchbacks at 5.4 and 5.6 miles from its junction with Hwy. 56. We searched ~80 m of creek including moss-covered riprap of roadbed. 100% O.C. Air 18°C. H<sub>2</sub>O 11°C. 5:15 p.m., 4 June.

51. Rocky, mossy seepage in Tsuga at ~3000 ft. elev. on F.R. 410, near mile marker 6. 100% O.C. Air 18°C. H<sub>2</sub>O 9°C. 5:50 p.m., 4 June.

52. Mossy, cascading creek in Tsuga and Thuja at ~3000 ft. elev. On F.R. 40, 4.3 miles from its junction with Hwy. 56 (1987 report: R3, 40). 100% O.C. Air 18°C. H<sub>2</sub>O 11°C. 6:40 p.m., 4 June.

53. Two cascading, mossy creeks in Pseudotsuga and Tsuga at ~4000 ft. elev. In timber stands within expansive clearcuts. Exposed, fractured bedrock adjacent. On F.R. 151, 9.5 and 9.6 miles from its junction with the Noxon-Trout Creek Road. 100% O.C. Air 11°C. H<sub>2</sub>O 4.5°C. 10:10 a.m., 5 June.

54. Two cascading, mossy creeks in clearcut Pseudotsuga (?). On F.R. 151, 8.8 and 9.1 miles from its junction with the Noxon-Trout Creek Road. 100% O.C. Air 11.5°C. H<sub>2</sub>O 5.5°C. 10:50 a.m., 5 June.

55. Cascading, mossy creek in Tsuga with Acer at ~3100 ft. elev. On F.R. 151, 7.3 miles from its junction with the Noxon-Trout Creek Road. 100% O.C. Air 12.5°C. H<sub>2</sub>O 5.5°C. 11:30 p.m., 5 June.

56. Boggy, mossy seepage in Thuja and Alnus at ~3250 ft. elev. On F.R. 215 near mile marker 9. 70% O.C. Air 20°C. H<sub>2</sub>O 5.5°C. 5:00 p.m., 5 June.

57. Gravelly seepage on rockface with sparse plant growth at ~3300 ft. elev. On F.R. 154, 0.4 mile west of Sims Creek site. 50% O.C. Air 14.5°C. H<sub>2</sub>O 5°C. 9:40 a.m., 6 June.

58. Vermillion Falls. Mossy, freestone stream at ~3400 ft. elev. in Pseudotsuga and Tsuga. Off F.R. 154. Searched rock debris on S. side of falls in sprayzone. 10% O.C. Air 14.5°C. H<sub>2</sub>O 8°C. 12:20 p.m., 6 June.

59. Mossy, cobbly brooklet in Pseudotsuga with Acer at ~3500 ft. elev. On F.R. 154, 0.1 mile W of mile marker 13. 10% O.C. Air 15°C. H<sub>2</sub>O 8°C. 1:10 p.m., 6 June.

60. Ice Creek. Cobbly, cascading creek with moss in Pinus contorta with Alnus at ~3600 ft. elev. On F.R. 367, ~2 miles from its junction with F.R. 154. 50% O.C. Air 15°C. H<sub>2</sub>O 8°C. 2:00 p.m., 6 June.

61. Seepages with sparse moss on bare roadcut rockfaces. On Hwy. 200 (near Flathead River), 2.3 and ~6.3 miles from its junction with Hwy. 135. 100% O.C. Air 18°C. H<sub>2</sub>O 6.5°C. 5:10 p.m., 7 June.

62. Five rocky, mossy seepages on roadcuts between 3200 and 4000 ft. elev. In Pseudotsuga and Thuja. On F.R. 282 at 8, 8.4, 9, 9.9 miles from its junction with Hwy. 90, and one at junction of F.R. 272 and F.R. 1156. 50% O.C. Air varied between 12°C and 10°C. H<sub>2</sub>O 6°C. 11:00 p.m. - 12:30 a.m., 7-8 June (1987 report: R3, 63b).

63. Twin Creek. Cascading, mossy creek in Betula at ~3000 ft. elev. On F.R. 320, ~10 miles from Superior city limits. 100% O.C. with heavy rain. Air 10°C. H<sub>2</sub>O 8°C. 4:30 p.m., 8 June (1987 report: R3, 67b).

64. Cobbly spring in Pseudotsuga at ~3000 ft. elev. Just south of Hole-in-the-Wall Ranch on F.R. 7750. 100% O.C. with heavy rain. Air 10°C. H<sub>2</sub>O 8°C. 6:50 p.m., 8 June.

65. Mossy, cobbly brooklet in Pseudotsuga with Betula at ~2800 ft. elev. on Big Pine Road (F.R. 343?) 6.5 miles S. of its junction with Hwy. 90. 100% O.C. with heavy rain. Air 10°C. H<sub>2</sub>O 8°C. 7:45 p.m., 8 June (1987 report: Sect. R3, 70).

66. Sweathouse site.

67. Upper Sweathouse Creek Falls. Heavily flowing falls over fractured granite rockface in Pseudotsuga. At ~5200 ft. elev. ~2.5 miles up F.S. Trail 121 from trailhead. Searched debris on both sides of falls. 0% O.C. Air 19°C. H<sub>2</sub>O 6.5°C. 2:00 p.m., 9 June.

68. Bear Creek Falls. Slick rock, shallow falls in Pseudotsuga at ~4200 ft. elev. Little creekside debris. On F.S. Trail 5, ~1.5 miles from trailhead. 0% O.C. Air 20°C. H<sub>2</sub>O 6°C. 11:30 a.m., 10 June.

69. Two mossy, cobbly seepages at ~4200 ft. elev. in Pseudotsuga On F.S. Trail 5 midway between trailhead and Bear Creek Falls. 0% O.C. Air 19.5°C. H<sub>2</sub>O 6°C. 12:30 p.m., 10 June.

70. Mill Creek Falls. Heavily flowing falls down ~30° incline of fractured granite. In Pseudotsuga at 4800 ft. elev. Searched



debris on N. side of falls. Best habitat on S. side. On F.S.  
Trail 364, 4 miles from trailhead. 50% O.C. Air 21°C. H<sub>2</sub>O 7°C.  
3:30 p.m., 10 June (Photo 29).

71. Bass Creek Falls. Heavily flowing falls over fractured  
granite rockface in Pseudotsuga at ~3500 ft. elev. Searched  
debris on N. side of stream. Best habitat on S. side. On F.S.  
Trail 4, 4 miles from trailhead. 50% O.C. Air 19.5°C. H<sub>2</sub>O 7°C.  
Noon, 10 June.

72. Woodman Creek Site.

## Conclusions

The present apparent distribution of the Coeur d'Alene Salamander (Map 9) is essentially as described in the 1987 report. Unsuccessful searches of seemingly good microhabitat in the northern Bitterroot River, and Mission Mountains near Flathead Lake (Map 8, Photo 26, 27, 28) indicate the salamander is absent or very rare in these regions, probably for reasons discussed in the preceding report. More work is needed to test earlier hypotheses on the salamander in the southern part of its range: that it is rare or absent in the Clark Fork drainage upstream from Missoula, and that the Bitterroot Mountains west of the Bitterroot Valley hold its southernmost Montana populations.

The eight new localities provide new insights and fill gaps in our knowledge of the salamander's dispersion in Montana. Discovery of the Cougar Mine, White Pine Creek, Simmons, and Paradise sites filled gaps between historical sites and showed that populations might be encountered in drainages associated with the lower Clark Fork River (but see Results Sect. 4; 62). Areas north of the Kootenai River may also have numerous populations as evidenced by the discovery of the Kooconusa 4, Pipe Creek, and Koot Creek sites. Kooconusa 4 is now the northernmost known locality in Montana, but we feel this will change with more exploratory work. At present the salamander is known from at least one Canadian site north of Idaho. The discovery of the Callahan Creek population is important because it demonstrated that the salamander may eventually be found in regions connecting the Kootenai River and Clark Fork River drainages. At this time, known populations are more-or-less closely associated with either drainage, but a large distributional gap exists between the two.

None of the new localities involve microhabitat that differs from that reported in the 1987 account. We feel the fracture zones associated with known populations make these fairly resistant to human disturbance, such as the roadwork that must certainly have affected the Kooconusa sites. Despite the blasting and easement widening that accompanied the damming of the Kootenai River more than a decade ago, the Kooconusa populations now appear healthy. Of course, we cannot say how much more widely distributed the salamander was along this reach of the Kootenai River before it was dammed. It may be that the salamander's present absence on the east bank is due to dam related disturbance.

## Recommendations

Aside from what we have suggested for known Coeur d'Alene salamander sites (Results Sects. 1,2), the most useful work remaining is further search for new populations. This will help elucidate the salamander's distribution in Montana and increase available information on its microhabitat. We suggest searches in the following areas.

Cabinet Mountains between the Clark Fork River and the Kootenai River.

### I. Lake Creek drainage.

- A. Upper reaches of Keeler Creek via F.R. 473.
- B. N. Fork Keeler Creek via F.R. 404.
- C. Spar Lake area via F.R. 384.
- D. Upper reaches of Ross Creek via F.R. 398.
- E. Falls Creek E of Savage Lake (Results Sect. 4; 5). Salamanders are probably here. Water has been too cold and the creek too swollen during our visits.
- F. Madge Creek via F.R. 398 (Results Sect. 4; 45, 46).

### II. Bull River drainage.

- A. E. Fork of the N Fork Bull River via F.R. 407 (Results Sect. 4; 52).

### III. Libby Creek drainage.

- A. Reservoir Creek via F.R. 128.
- B. Streams along F.R. 278 and F.R. 231.
- C. Granite Creek via F.R. 618.
- D. Howard Lake area.

### IV. Fisher River drainage.

- A. W. Fisher Creek via F.R. 231.
- B. Silver Butte Creek via F.R. 148.

Northern Salish Mountains east of Lake Koochanusa.

1. Pinkham Falls (Results Sect 4;12). Water level was high during our visit (Photo 26). A woman from Rexford informed us that she found "black salamanders with yellow stripes down their backs" in fractures below the falls during a biology field trip when she was a child ~25 years ago.
2. Pinkham Creek drainage via F.R. 856 (Results Sect. 4; 25).
3. Wolf Creek/Dry Fork Creek via F.R. 36.

Purcell Mountains north of the Kootenai River.

1. Spread Creek via F.R. 435.
2. Pete Creek via F.R. 338.
3. Burnt Creek via F.R. 472.

Clark Fork River drainage.

1. Loveland Peak above the Noxon site.
2. Ellis Gulch across the Clark Fork from Noxon (original report Sect. R3; 42). A night search would be useful here. During a visit here in 1987 the access was good and microhabitat seemed favorable. We found only Ambystoma macrodactylum.
3. Upper reaches of Marten Creek (Results Sect. 4; 53, 54, 55) via F.R. 151.
4. Graves Creek via F.R. 367.
5. W. Fork of the Thompson River via F.R. 603. We briefly looked here. This region is much more damp than that surrounding the Thompson River sites and should be searched.
6. Seepages and creeks in the St. Regis River drainage accessed by Interstate Hwy. 90 (Results Sect. 4; 62). This area needs more work. Our inability to find salamanders along the Little Joe Creek shows the distribution of the salamander in the St. Regis drainage may be spotty.
7. Nine Mile Creek drainage via F.R. 412.
8. Rattlesnake Wilderness.
9. Creeks in the Lolo River drainage accessed by U.S. Hwy 12.
10. Creeks and seepages along the S bank of the Clark Fork River east of Missoula, between the Milltown and Clinton areas (1987 report, Sect. R3; 75, 76).

Bitterroot Mountains west of the Bitterroot Valley. Access here is poor, except that potential sites can be reached by more-or-less short hikes. We feel the best time to search here is in the fall, due to the high water levels earlier in the year.

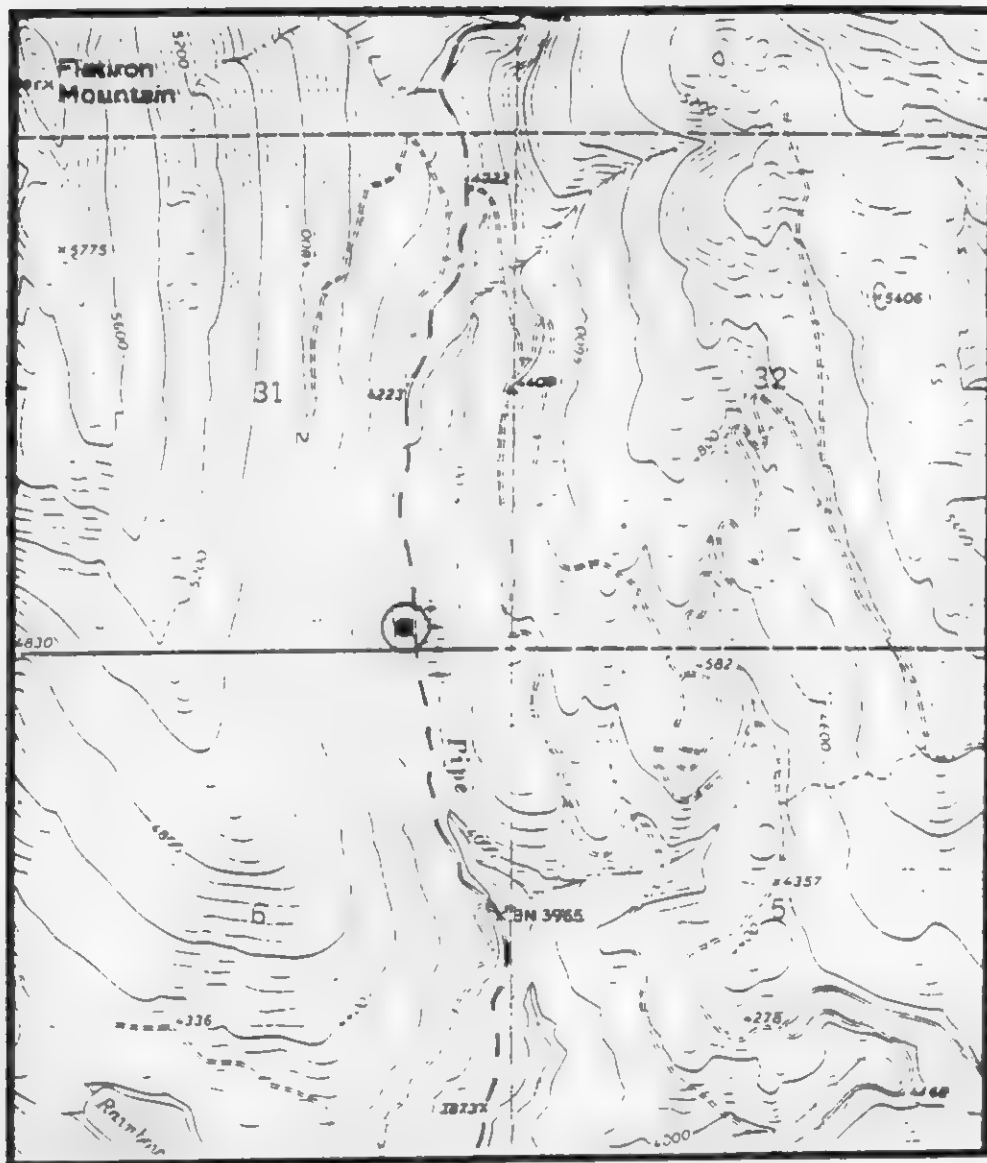
1. Upper Sweathouse Falls via Trail 121 (Results Sect. 4; 67).
2. Mill Creek Falls via Trail 364 (Results Sect. 4; 70). Of the Bitterroot falls unsuccessfully searched, this seems to have the best microhabitat.
3. Lake Como Falls via Trail 502.
4. Boulder Creek Falls via Trail 617.

Map 1  
Kooconusa 4 sites

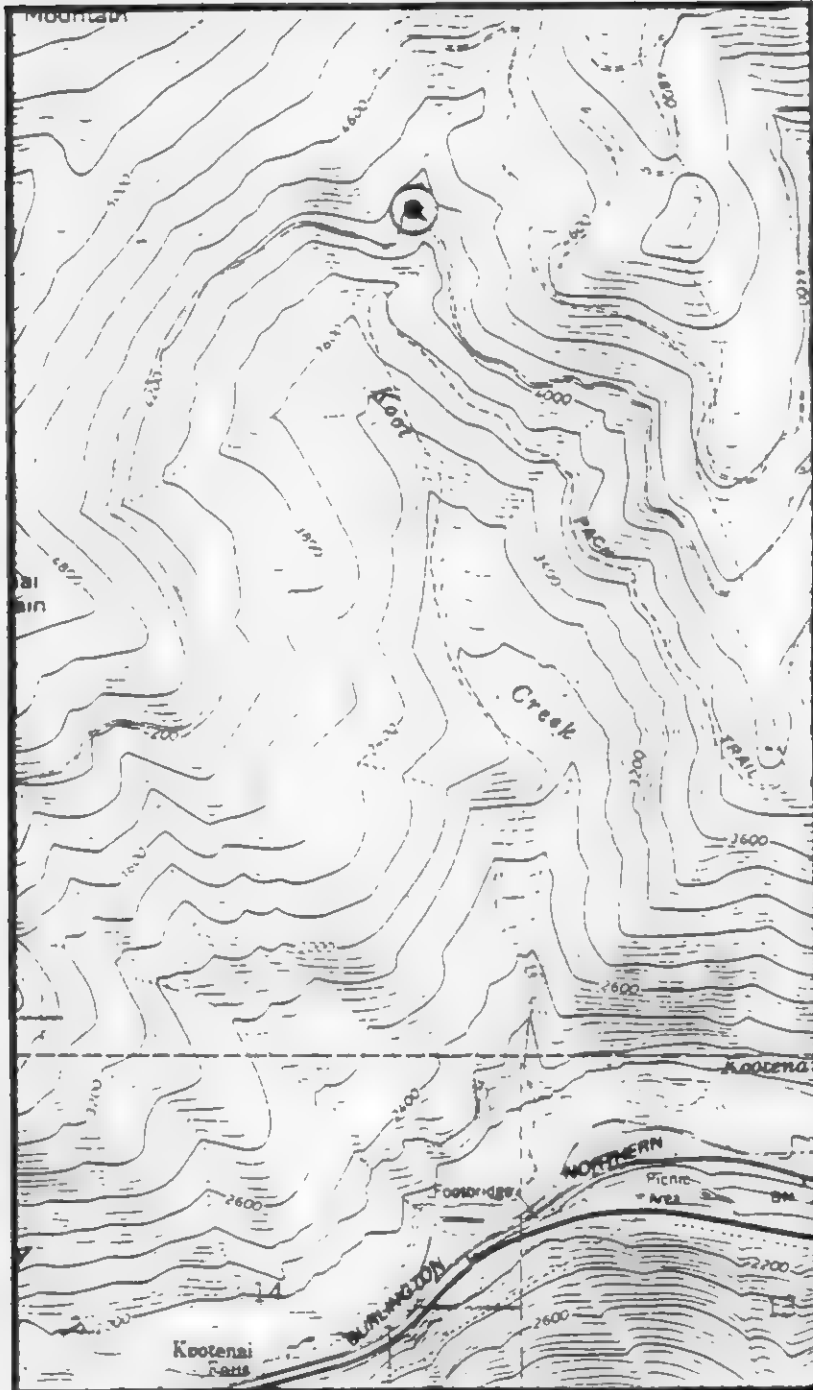




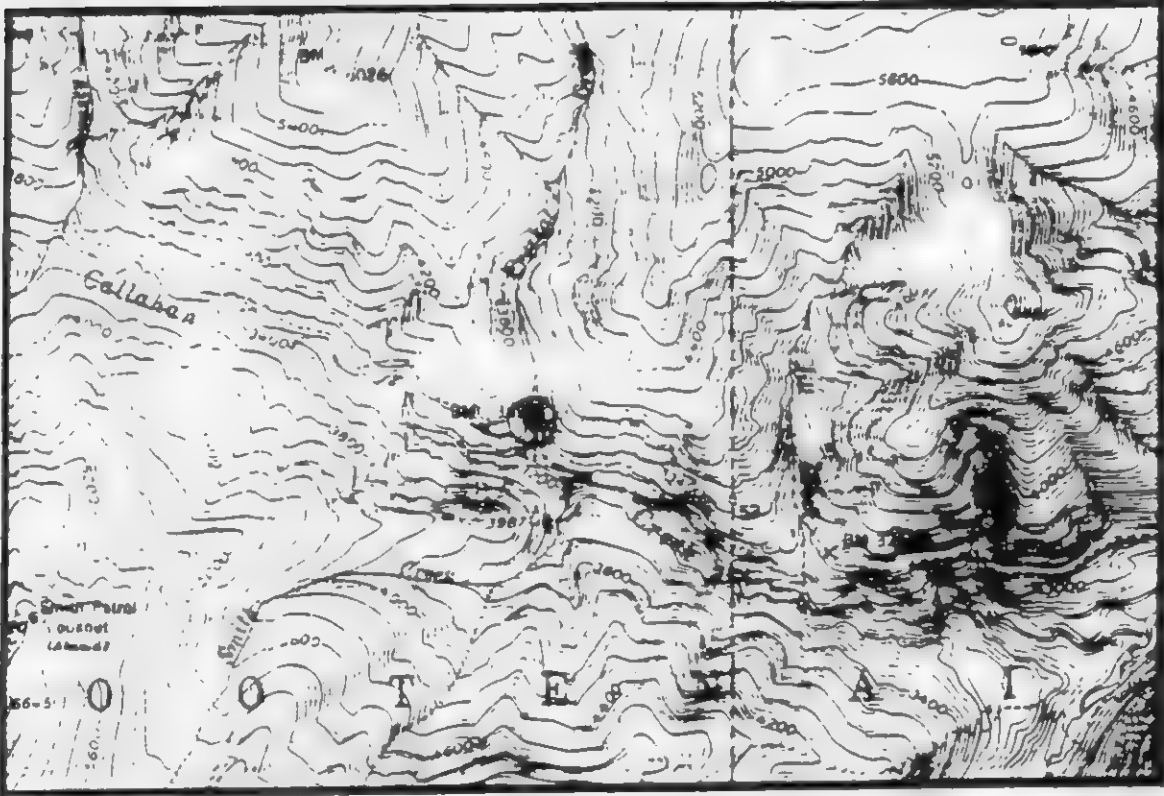
Map 2  
Pipe Creek site



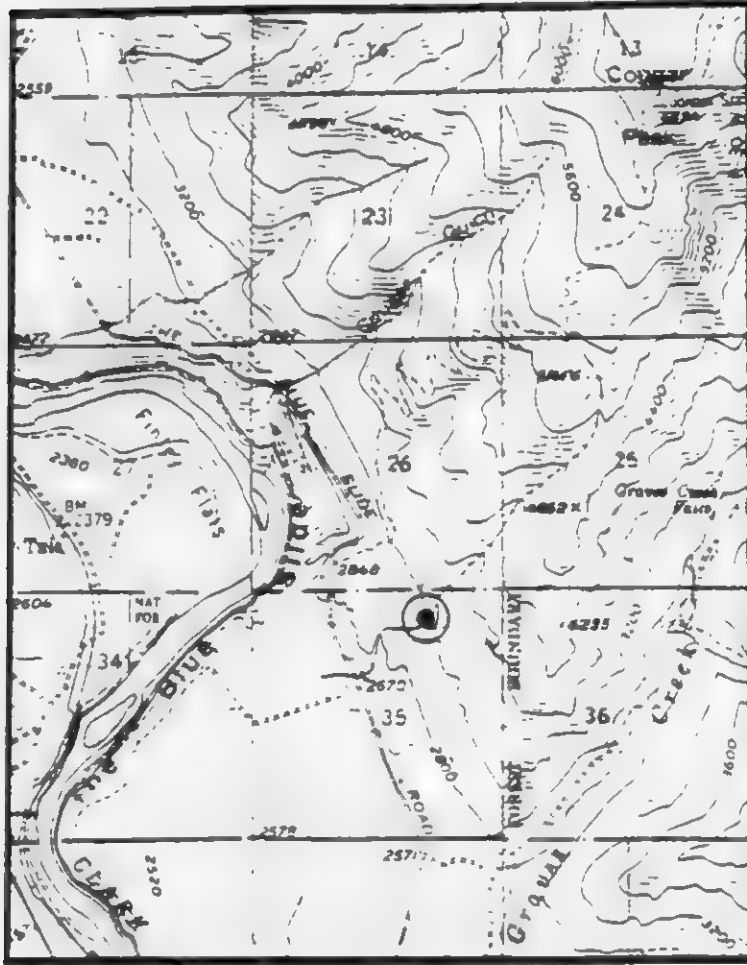
Map 3  
Koot Creek site



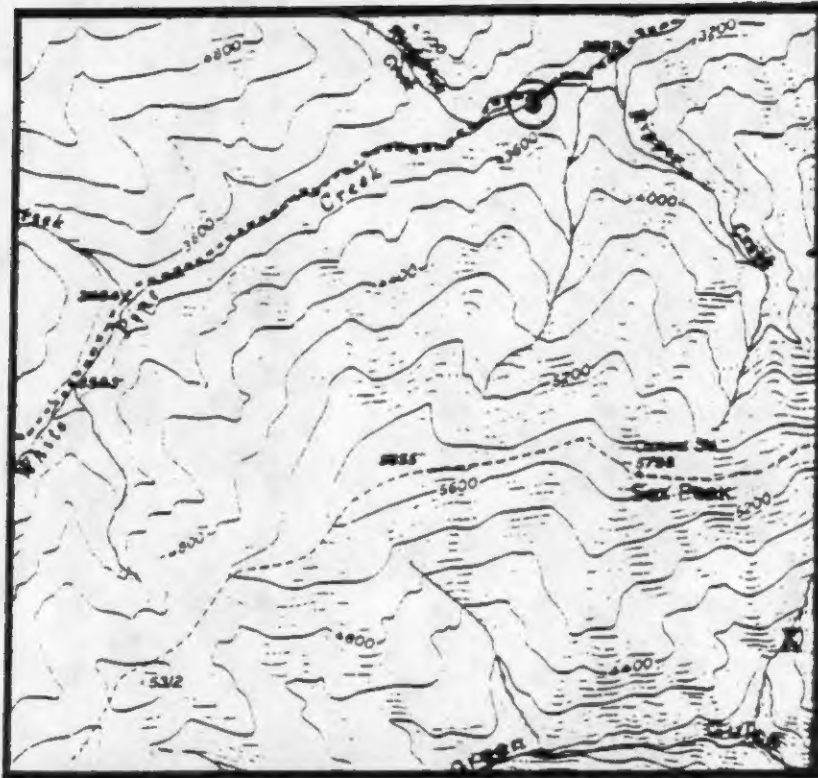
Map 4  
Callahan Creek site



Map 5  
Cougar Mine site

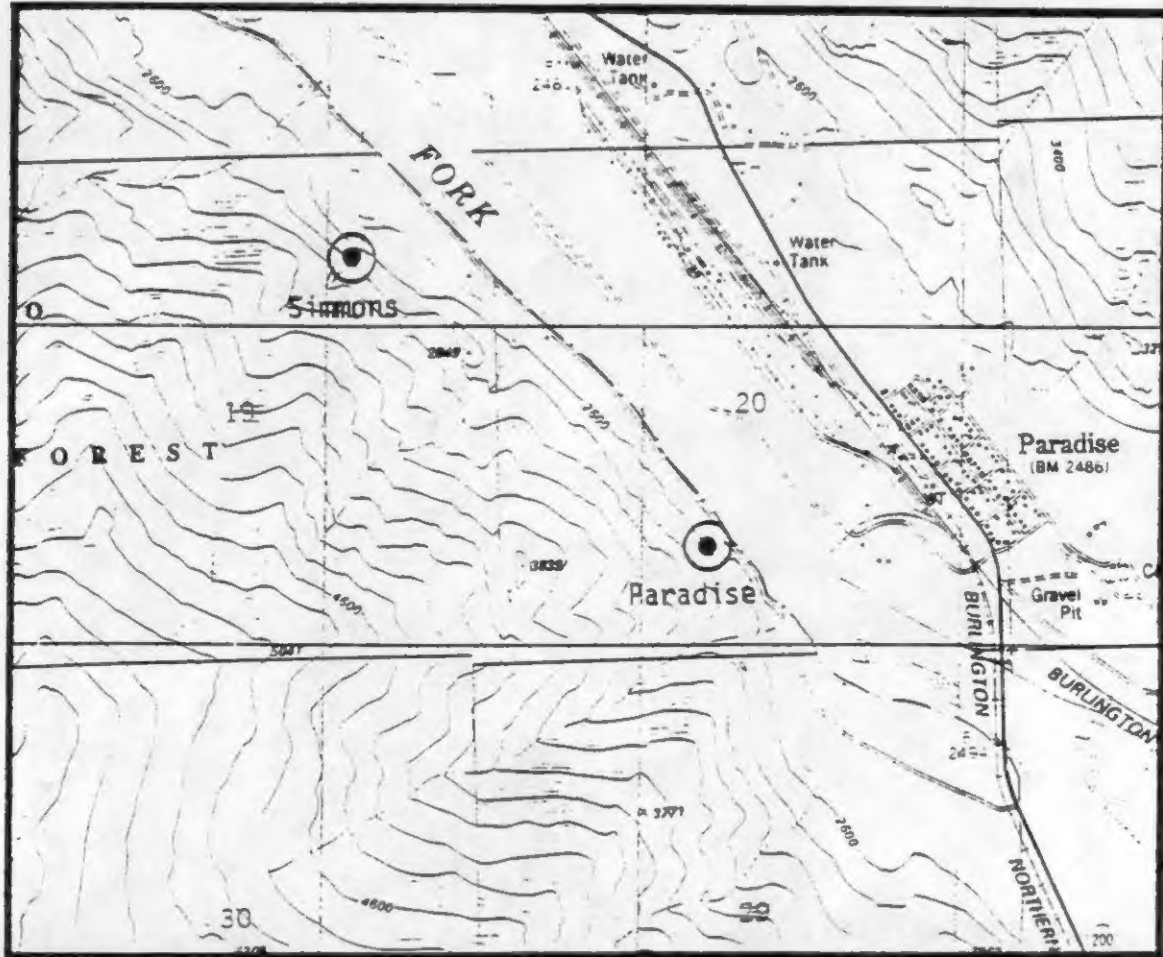


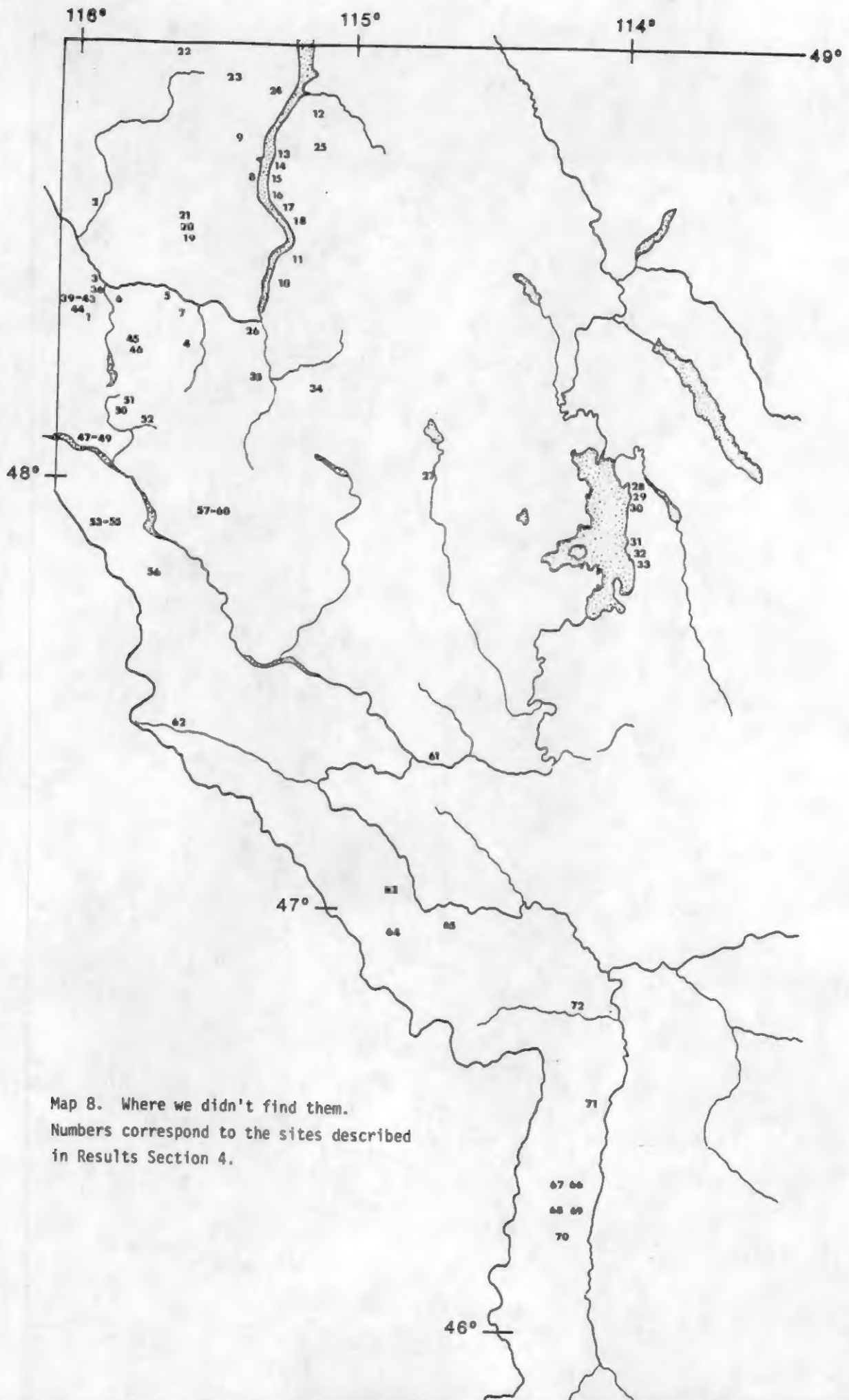
Map 6  
White Pine Creek site





Map 7  
Simmons and Paradise sites







Map 9. The distribution of the  
Coeur d'Alene Salamander in Montana.  
Open circles denote verified localities.